

WHAT IS CLAIMED IS:

1. A micro mixer having at least one means of creating a time-varying force field for inducing homogenization of a first and second sample component within a micro mixer channel at a rate greater than that of diffusion alone, and wherein the time-varying force field creates a transverse force upon a sample interface between the first and second sample component.

2. A micro mixer of claim 1, wherein the time-varying force field used to generate a transverse force on a first sample component and a second sample component separated by a sample interface is at least one of a physical displacement field, electrical field, pressure field, or a magnetic field. *claim 13-16*

3. A micro mixer of claim 2, wherein the physical displacement field creates a transverse force using at least one well in the micro mixer channel.

4. A micro mixer of claim 2, wherein the physical displacement field creates a transverse force using at least one obstacle in the micro mixer channel.

5. The micro mixer of claim 2 wherein the electrical field is created by an AC or a DC source. *in chapters 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100*

6. A micro mixer of claim 5, wherein the electrical field creates a transverse force using at least one electrode adjacent to the micro mixer channel, and wherein the electrode is activated to a selected first voltage and subsequently modulated to a second selected voltage at a selected interval to induce electrokinetic perturbations in the sample interface.

7. A micro mixer of claim 6, wherein the second selected voltage is zero volts.

8. A micro mixer of claim 5, wherein the electrical field creates a transverse force using at least one electrode adjacent to the micro mixer channel, wherein the electrode is activated to a first selected frequency and subsequently modulated to a second selected frequency to induce electrokinetic perturbations in the sample interface.

9. A micro mixer of claim 5, wherein the electrical field creates a transverse force by application of at least a first voltage at a first frequency by a first electrode and application of at least a second voltage at a second frequency by a second electrode, and wherein the first voltage and/or first frequency of the first electrode is modulated at a selected interval, and wherein the second voltage and/or second frequency of the second electrode is not modulated.

10. A micro mixer of claim 5, wherein the electrical field creates a transverse force by alternate application of a at least first voltage at a first frequency between a pair of electrodes and a second voltage at a second frequency between the pair of electrodes.

11. A micro mixer of claim 5, wherein the electrical field creates a transverse force by alternate application of a at least first voltage between a first pair of electrodes and a second voltage between a second pair of electrodes.

12. A micro mixer of claim 5, wherein the electrical field creates a transverse force by alternate application of a at least first voltage at a first frequency between a first pair of electrodes and a second voltage at a second frequency between a second pair of electrodes.

13. A micro mixer of claim 2, wherein the time-varying force field is a transverse force field created by introduction of a first sample into the micro mixer channel at a first flow rate and introduction of a second sample into the micro mixer channel at a second flow rate.

14. A micro mixer of claim 2, wherein the mechanical field creates a transverse velocity by a hydrodynamic pressure field.

15. A micro mixer of claim 14 wherein a hydrodynamic pressure field is created by at least one pressure reservoir in communication with at least one adjacent channel unit for the application of a transverse force upon the sample interface in the micro mixer channel.

16. A micro mixer of claim 15 wherein a pressure field is created by introducing a first sample into the micro mixer channel at a first rate and a second sample into the micro mixer channel at a second rate.

17. ^N A micro mixer of claim 3 wherein the magnetic field creates a transverse force using at least one magnet adjacent to the micro mixer channel, and wherein the magnet is activated to a selected first polarity at a second direction and modulated to a second selected polarity at a second direction to induce electrokinetic perturbations in the sample interface.

18. A micro mixer of claim 2, wherein the transverse force is at an angle of 90° to the sample interface.

19. A micro mixer of claim 2, wherein the transverse force is at an angle of less than 90° to the sample interface.

20. A micro mixer of claim 1, wherein the micro mixer is open chambered.

21. ^N A micro mixer of claim 1, wherein the micro mixer is close chambered.

~~22.~~ A microdevice comprising a micro mixer having at least one means of creating a time-varying force field for inducing homogenization of sample components within a micro mixer channel at a rate greater than that of diffusion alone.

~~23.~~ A method of inducing sample mixing utilizing a micro mixer having at least one means of creating a time-varying force field for inducing homogenization of sample components within a micro mixer channel at a rate greater than that of diffusion alone.